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with water and the addition of some available form of potash or ammonia is all that is needed to crystallize out the common potash or ammonia alums of commerce. Now, in the case of this Nebraska bluff, this oblong mass of heated debris bears no very distant resemblance to a "curing heap" of an alum manufacturer. The presence of the limestone is, to be sure, most unfortunate, and would necessarily be avoided if the acidified shale was to be handled with a view to profit. The small quantity of the magnesium carbonate present would be by no means unpropitious, as the manufacture of Epsom salts and the alums is frequently carried on together at a handsome profit. If the accounts of intelligent observers are to be accepted, there would seem to be little doubt that this region may prove available in these branches of manufacture. But whether thus utilized or not, this display is surely a most fascinating one to the chemist and mineralogist—nature seeming, in some degree, to have pulled aside the curtain and given us a peep behind the scenes, where we are permitted to see her in the very act of forging these marvels of crystalline creation.

KANSAS CHALK.

By G. E. Patrick, Professor of Chemistry and Physics, Kansas University.

The existence of chalk in North America is a comparatively new fact in science. Prof. Dana, in his Manual of Geology, (editions previous to the last, 1874,) says, in speaking of the Cretaceous beds of this country, "they include in North America no chalk." Within the last few years, however, it has become generally known to the scientific men of Kansas, that there occur, in the Cretaceous formation of this State, vast beds of what must be considered a true chalk. Specimens of this have been sent to Prof. Dana for examination, with the result that in the last edition of his Manual, (1874,) he corrects the statement above quoted, and acknowledges the existence of chalk in the Cretaceous of Kansas.

The beds are of great extent, so great that in case a demand for it should ever arise, the supply would be practically limitless. They are in the western part of the State, from three hundred to three hundred and twenty miles west of Kansas City, and within three miles of the Kansas Pacific Railroad.

The chalk is, as a rule, very soft and fine grained, though in this respect it varies with the amount of impurities. The color of many specimens I have seen, is a snowy white; but a large portion of it is slightly tinged with yellow, by oxide of iron.

Examined under the microscope, it appears perfectly amorphous—a simple aggregation of shapeless particles. The Rhizopod shells, which almost universally occur in the chalk of the Old World, sometimes comprising nearly its entire substance, seem to be quite wanting in our Kansas chalk. With a good microscope, and a high power, I have been unable to detect any trace of them.

To believe that these shells were originally in the chalk, during its formation and subsidence, and that by water action they have become so completely disintegrated as not to leave a trace, involves too great an assumption; hence it is my opinion that our chalk was not formed, like that of England and France, by the aggregation of myriads of Rhizopod skeletons—

that it is not in any way the product of animal life—but that its origin was purely chemical. The absence of flint, as far as observed, seems also to add weight to this view.

The amount of impurity varies of course, in different samples of the chalk, but in no specimens that I have seen does this amount exceed fifteen to sixteen per cent.

Two samples yielded, upon analysis, the figures given below. No. 1 was a fine specimen of snowy whiteness; No. 2 had a light yellowish tinge, and was as poor a sample as I could select.

	No. 1.	No. 2.
Moisture	.34	.58
Insoluble in acids, (silicia, lime and alumina.)	.69	11.40
Alumina, (little oxide of iron)	.43	.97
Ferrous carbonate	.14	2.83
Calcium carbonate	98.47	84.19
	100.07	99.97

The value of these deposits, from a practical point of view, I believe to be considerable; and that this value may be realized, capital and enterprise only are needed.

Among the possible uses to which this material may be applied, I would mention, as giving the greatest promise of profit, the manufacture of whiting of the various grades, for putty, for calcimining et cetera; and the manufacture of Portland cement. The latter is a branch of industry not yet established in the United States; and this simply for the reason that in the older States where such a manufacture would otherwise have arisen, chalk, an essential in the economical manufacture of this cement, was not to be found.

One other essential, (and the only other), is clay. Only where these two materials are found in quantity, can the manufacture be most profitably carried on; and these conditions are fulfilled in this country, as far as our present knowledge extends, only in this State.

Portland, on account of its vast superiority over our American cements, has, in our growing cities, a large sale—which, however, is checked by its high price consequent upon importation. Its price is from two to five times that of the various American cements.

Common hard limestone can be used instead of chalk, in the manufacture of Portland, by previously grinding it to a fine powder in a mill; or by burning it to lime in a kiln, and then slaking. But consumption of power required to reduce it to powder, or of fuel used in the extra kilning, places it under great disadvantage when compared with chalk.

With this disadvantage in view, however, General Gilmore, Major Corps of Engineers U. S. A., has estimated accurately the cost per ton of making Portland cement in this country, using hard limestone instead of chalk.* After computing the exact cost at current prices, and adding a margin of twenty per cent. for contingencies, he sums up as follows: "In the United States the cost would not vary greatly from $10.00 per gross ton. * * * * * This estimate is believed to be a liberal one. It shows that Portland cement can be manufactured in this country at a cost less by from twelve to fourteen per cent. than the wholesale market price of Rosendale, omitting the cost of barrels in both cases."

*Professional Papers of Corps of Engineers of U. S. A., Number 19.

Making use of chalk, instead of hard limestone, this cost would be greatly reduced.

A large number of manufacturing experiments, which I have conducted upon a small scale in the laboratory, have proved by practical demonstration that there can be made from materials at hand in this State, a Portland cement quite as good in quality as the imported article; and that this can be done in Kansas at an expense much less than in any other State in the Union, is equally well established.

ANALYSIS OF KANSAS SOILS.

By G. E. Patrick, Professor of Chemistry and Physics, in University of Kansas.

I have recently submitted to analysis samples of two soils from Wallace county, Kansas. As the results show them to be quite rich in certain elements of plant-food, and as no soils from that part of the state have heretofore been analyzed, it may not be out of place to submit a report of my analyses to the Academy.

Both samples were collected in September, 1875, by Mr. S. W. Williston, member of Professor Mudge's geological party. Neither of the plats from which they were taken has ever been cultivated.

Both samples were thoroughly air-dried, at ordinary temperature of the laboratory, before analysis.

SAMPLE NO. 1.

This was an upland soil, taken from the high prairie of Smoky Hill Valley, near Monument Rocks, Wallace county.

It yielded upon analysis:

Water		3.449
Organic matter		5.224
Soluble in cold hydrochloric acid..	Oxide of Iron	1.778
	Alumina	.721
	Lime	1.618
	Magnesia	2.084
	Potassa	.202
	Soda	.002
	Silicic acid	.023
	Sulphuric acid	.078
	Carbonic acid	2.567
	Phosphoric acid	.118
	Sodium chloride	.009
Insoluble in cold hydrochloric acid		82.127
		100.000

SAMPLE NO. 2.

This sample was taken from the upper loam of the Smoky Hill Valley bottom lands, thirty miles east of Fort Wallace, Wallace county.